SNIE 11-9-61
25 April 1961

SECRET

CIA HISTORICAL REVIEW PROGRAM
RELEASE IN FULL

SPECIAL

NATIONAL INTELLIGENCE ESTIMATE

NUMBER 11-9-61

THE POSSIBILITY OF SOVIET NUCLEAR TESTING DURING THE MORATORIUM

Submitted by the
DIRECTOR OF CENTRAL INTELLIGENCE

The following intelligence organizations participated in the preparation of this estimate: The Central Intelligence Agency and the intelligence organizations of the Departments of State, the Army, the Navy, the Air Force, The Joint Staff, and the Atomic Energy Commission

Concurred in by the
UNITED STATES INTELLIGENCE BOARD

on 25 April 1961. Concurring were The Director of Intelligence and Research, Department of State; the Assistant Chief of Staff for Intelligence, Department of the Army; the Assistant Chief of Naval Operations (Intelligence), Department of the Navy; the Assistant Chief of Staff, Intelligence, USAF; the Director for Intelligence, Joint Staff; the Atomic Energy Commission Representative to the USIB; the Assistant to the Secretary of Defense, Special Operations; and the Director of the National Security Agency. The Assistant Director, Federal Bureau of Investigation, abstained, the subject being outside of his jurisdiction.

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THE POSSIBILITY OF SOVIET NUCLEAR TESTING DURING THE MORATORIUM

THE PROBLEM

To estimate whether the Soviets have conducted clandestine nuclear tests during the moratorium which began in November 1958.

THE ESTIMATE

1. The USSR conducted a nuclear test series ending on 3 November 1958, and since that time has indicated that it, along with the US and the UK, was observing a moratorium on testing. In considering whether or not to conduct clandestine nuclear tests during this moratorium, the Soviet leaders would have had to weigh the importance of obtaining additional data for their nuclear weapons program, the possibility of being caught, and the costs of exposure.

Considerations Affecting the Soviet Position

2. *Technical Motivations.* Soviet nuclear weapon development activity has continued at a high level during the moratorium. Nevertheless, we believe that only limited improvements in Soviet weapons capabilities would have been possible without further tests. An analysis of Soviet weapons development indicates the following principal areas in which the USSR might have desired to conduct further tests since November 1958: (a) tests related to antiballistic missile effects; (b) tests of low yield, light weight devices; (c) tests directed toward increasing economy of fissile materials; (d) tests to improve the yield-to-weight ratio of all classes of nuclear weapons; (e) new areas of development, such as tests of enhanced radiation and pure fusion weapons of low yield. Of these, the Soviet requirement with regard to antiballistic missile effects probably is the most urgent.

3. The necessity for additional Soviet tests to optimize or improve existing weapons, or to develop new designs, depends heavily on Soviet strategy and on the character of future weapon systems. We believe that nuclear weapons are available for all the delivery systems which we know to be in the Soviet arsenal or which we estimate to have been under development. However, many of these weapons probably are not of optimum design, and serious gaps in the Soviet knowledge on weapons effects for certain military applications may exist. Almost certainly there have ben pressures within the USSR for continued nuclear testing, on all the various grounds cited above.

4. *Political Considerations.* The Soviet leaders must have recognized that it would be a major blow to their public position if it were demonstrated to the satisfaction of the bulk of the Free World nations that they had been testing nuclear weapons covertly. They have set great store by their campaign to capture the "peace" theme in world opinion and to present themselves as the proponents, and the West as the opponents, of a halt to the arms race. In balancing the possible political costs against the considerations arguing for covert

testing, we believe that the Soviet leaders would have required very high assurances that such testing could not be proved, or even plausibly charged, against them before entering on such a program. At a minimum, this consideration would have narrowed the choice of tests they might make; at a maximum, it would have inhibited them from testing at all.[1]

5. During the past year or so, some US statements have raised in the Soviet mind the possibility that the American side might soon openly resume testing. This factor probably gave increased weight to arguments within the USSR that it should not run the risk of being caught testing during this period.

Techniques Minimizing the Risk of Detection

6. If the Soviets attempted to conduct clandestine nuclear tests, they would have sought to minimize the risk of detection by doing so under conditions which did not put nuclear debris into the atmosphere.[2] Any such tests would have had to be conducted either underground or in space. The possibility that tests in space can be detected decreases as the distance from the earth is increased. Tests in either of these environments—underground or outer space—are within Soviet capabilities.

7. At present, the US detection system has no capability to detect nuclear explosions occurring in outer space. However, intelligence does have a capability to direct attention to those missile/space activities which could be employed in such testing. Intelligence probably cannot establish whether nuclear tests in space have in fact taken place, although it might provide some basis for judgment.

8. Fully contained underground tests, like space tests, provide no airborne radioactive debris which would provide positive identification of a nuclear event. However, there are limits to the yields of devices (up to about 100 KT) which can feasibly be tested in this manner, although many of the principal areas of development in which the USSR might have desired to conduct tests since November 1958 (as indicated in paragraph 2, above) could have been accomplished by underground tests of a few kilotons. Moreover, the signals produced by such tests may be detectable by seismic means, although such detected signals cannot be distinguished from natural seismic events. The capability of the seismic component of the US detection system can be significantly degraded by conducting the test in a hard medium, such as granite or salt, or by decoupling. An even greater reduction could be achieved by a combination of these techniques—decoupling in a hard medium. However, the scale of operations required for carrying out decoupling tests is such that other intelligence techniques would have an increased opportunity for detecting them.

Evidence of Possible Testing

9. Proof that nuclear weapons tests have occurred is difficult to obtain without collection of debris, since the other indicators of testing activity are susceptible to alternative explanations. Conversely, proof that tests have not occurred has not been possible. Since 3 November 1958, the US has collected no nuclear debris or other conclusive evidence that the Soviets have conducted nuclear tests. Each year a large number of seismic events are detected in the USSR; some of those occurring during the moratorium could have been the result of nuclear explosions, but none could be identified as such. There are indications from other intelligence sources which have raised the possibility of Soviet evasion of the moratorium by means of contained underground testing, but these also are susceptible to alternative explanations. Each suspected

[1] The Assistant Chief of Staff, Intelligence, USAF, believes that this paragraph overemphasizes the Soviet concern for a favorable international image. Further, there is little likelihood of the exposure problem arising since the Soviets can use, indeed probably have used, testing techniques that deny confirmation of violations.

[2] Pure fusion devices will not produce fission products and therefore will not produce evidence proving testing. We have no knowledge of Soviet development in this field, and the feasibility of such advanced concepts has not yet been conclusively demonstrated. The Assistant Chief of Staff, Intelligence, USAF, considers that available evidence indicates that the Soviets have been working on the development of pure fusion weapons since at least 1952.

event, or plausible indication, must be examined separately and exhaustively.

10. Accordingly, we have made an intensive survey of all the evidence, from all sources and all regions of the USSR, bearing upon possible Soviet nuclear testing during the moratorium. The most suspicious evidence relates to Southern Turkestan, in particular around Osh, and to Semipalatinsk. The data are most consistent with the thesis that the Soviets had conducted one or more large HE explosions near Osh in the winter of 1959–1960 as a part of their seismic improvement program or to study methods of clandestine nuclear testing, but the conduct of an actual nuclear test cannot be ruled out. Nuclear testing in other areas in Southern Turkestan appears less likely than in the case of the Osh area. The Semipalatinsk proving ground area has remained active since the moratorium, and photography in April 1960 shows evidence of additional but not recent low-yield, venting tests since the previous coverage in August 1957. Evaluation of all evidence indicates it is more likely that these tests occurred between 1957 and the commencement of the moratorium in November 1958 rather than during the moratorium period. An apparent ground zero area outside the fenced shot area was under construction in 1960, but it is probable that this ground zero has not yet been used. There is even less evidence relating to possible testing in areas outside of Southern Turkestan and Semipalatinsk.[3]

11. On technical grounds, we cannot exclude the possibility that tests in contained underground environments or, less likely, very low-yield, vented explosions have occurred. However, the political costs of exposure have probably been regarded by the Soviets as high enough to deter them from any kind of nuclear testing which had an appreciable chance of being detected, and we doubt that the technical advantages to be gained from very low-yield tests would have been sufficiently great in the Soviets' mind to justify their conducting them. The conclusion that the Soviets have conducted nuclear tests since 3 November 1958 cannot be drawn from the available evidence.[4] [5]

[3] The Assistant Chief of Staff, Intelligence, USAF, believes that the evidence relating to Southern Turkestan and the Semipalatinsk area closely follows a pattern of activity indicative of nuclear testing and that this testing probably took place since November 1958.

[4] The Atomic Energy Commission Representative to the USIB, although concurring that a conclusion as to whether or not the Soviets have been conducting clandestine tests cannot be drawn from the available evidence, considers that the technical advantages to be gained from very low-yield tests could have been sufficiently great in the Soviets' mind to justify their conducting them. He also believes that very low-yield tests conducted underground would almost certainly not be detected.

[5] The Assistant Chief of Staff for Intelligence, Department of the Army; the Assistant Chief of Staff, Intelligence, USAF; the Director for Intelligence, Joint Staff; and the Assistant to the Secretary of Defense, Special Operations, do not support the conclusions reached in this paragraph. They would substitute the following:

The evidence is such that we cannot conclusively establish that the Soviets have or have not tested. The USSR has considerable knowledge of our nuclear detection capabilities. Because of this knowledge and because a high degree of conventional security could be maintained, the Soviets are no doubt aware that but negligible risk of detection is associated with low-yield contained underground, or very low-yield atmospheric tests. Many of the principal development objectives for which the USSR might have desired to conduct tests since November 1958 could have been accomplished by underground tests of a few kilotons. In particular, we believe that the need by the USSR for data on antiballistic missile warhead effects has been critical in the period since November 1958. This need could have been at least partially satisfied by low-yield contained underground testing. In addition, we believe that the potential of the all-fusion weapon theory, of which the Soviets are aware, has generated or will generate strong need for the very low-yield tests required for research and development and proof testing of all-fusion weapons. In the light of the evidence, their technical need to have tested during the period since November 1958, coupled with the negligible risks involved, we conclude that a strong possibility exists that the Soviets have tested since 3 November 1958.